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BOTANY.—*Cosmos sulphureus, the xochipalli or flower paint of the Aztecs.* WILLIAM EDWIN SAFFORD, Bureau of Plant Industry.

Vegetable dyes were used by the aborigines of all parts of America for ornamenting their utensils, staining their bodies, or coloring their baskets and fabrics. Many of the textiles found in the prehistoric graves of Peru are remarkable for their beautiful and permanent colors. Few of these, unfortunately, can be traced to the plants from which they were derived. The introduction of foreign dyes has been disastrous. Their cheapness and the facility with which they can be transported has caused them to be widely adopted in place of native dyes, the preparation of which is fast becoming obsolete. The ancient Mexicans made use of a number of beautiful pigments, mostly vegetable, for the picture-writing of their celebrated codices. Nearly all of their colors can be identified. A crimson was obtained from the cochineal insect, reared upon a cactus (*Nopalea coccinellifera*). This they called nocheztli, or "prickly-pear-blood." With it they sometimes combined other ingredients, especially the leaves of a Melastomataceous plant called tezoatl, or texhuatl. From the reddish-yellow aril of the seeds of *Bixa orellana* they derived a pigment called achiotl. This is now widely used throughout the world, and is known commercially as annatto, or arnotto. A bright yellow was obtained from a leafless parasitic plant, *Cuscuta tinctoria*, called zacatlaxcalli. From logwood *Haematoxylon campechianum*, and the closely allied *Hae-*

matoxylon brasiletto, called uitzquauitl, or huitzcuahuitl, they obtained a purple, and other shades, resulting from various additional ingredients. The use of this wood is now world wide. From the twisted pods of *Caesalpinia coriaria*, called nacascolotl, they obtained a fine black. These pods, known commercially as cascalote or dividivi, are now an important source of tannin. Another dye-plant, interesting on account of its old-world affinities, was their xiuhquilitl, *Indigofera suffruticosa*, more commonly known as *Indigofera anil*, and very closely allied to *Indigofera tinctoria*, from which most of the commercial indigo is derived; and another beautiful blue, called mohuitli, was obtained from *Jacobinia mohintli* and *J. umbrosa*.

One of their colors, however, which all writers on Mexico mention, has hitherto remained unidentified. This was called xochipalli, or "flower-paint," a name also applied to the plant itself. It is the object of the present paper to announce its rediscovery and to give a description, by means of which the plant can be identified with certainty. The most remarkable fact in connection with this plant is that, although it was described and figured more than three centuries ago, it has remained hitherto unidentified. It is widely spread in Mexico. In the present State of Guerrero there is a town, Xochipalla, the name of which signifies "the place where the xochipalli abounds."[1] The celebrated traveller, Gemelli-Careri, who visited this town in 1697, while en route from Acapulco to Cuernavaca, passed through a neighboring district where the girls gathered xochipalli flowers and made of them a cosmetic paste. The Proto-Medico, Dr. Francisco Hernandez, who was sent by his sovereign Philip II in 1570 to New Spain to study its resources, gave the following description of this plant, illustrated with a rude drawing, a fac-simile of which is here shown (fig. 1).

"Xochipalli is an herb six cubits in length, with sinuous (pinnatifid) leaves somewhat like those of Artemisia, stems a finger thick, flowers resembling those of the cempoalxochitl [*Tagetes erecta* L.], but smaller and of a reddish yellow color, and roots slender and long. It is widely spread in the *tierras calientes*,

[1] See Robelo, Diccionario de Aztequismos, pp. 444, 447, 449. 1904.

and is an herb well known to everybody. Only the flower is used, the which is moderately hot and of an agreeable odor and taste, comforting the heart, curing maladies of the womb and ulcers, especially those of the mouth. But the chief use of the flowers is for dyeing wool and painting images and objects of a yellow color which in a certain manner verges to red, for which object they are boiled in water together with an alkali, after which the juice is expressed and strained, yielding a color which is used by painters and dyers, for the purposes we have indicated."[2]

A search for the name xochipalli, or its modern variant, suchipal, in Ramirez and Alcocer's *Sinonomia vulgar y cientifica de las plantas Mexicanas* was without result, nor could it be found in the *Nueva farmacopea Mexicana*. In Siméon's monumental *Diccionnaire de la langue Nahuatl*, however (p. 701) the importance of this plant is attested by the following definitions: "*Xochipalli* ou *Xuchipalli*, Herbe dont la feuille ressemble a celle de l'artémise et sert à teindre les étoffes en jaune rouge; couleur rouge, rose. RR. *xochitl, palli*." Robelo, also, in his *Diccionario de Aztequismos* (p. 444) refers to it as follows: "Suchipal (Xochipalli: *xochitl*, flor; *palli*, color: 'flor-color,' ó 'color de flor'). Yerba cuya hoja se parece á la artemisa, y sirve para teñir las telas de amarillo, rojo ó naranjado." On page 447, note 23, he says: "Esta planta no está clasificada;" and on page 449, under geographical names, he includes "Xochipala (xochi-pal-la: *xochi-palli, ó xuchi-palli, suchipal; la*, variante de *tla*, particula abundancial):" "Donde abunda el suchipal."

In response to letters of inquiry the writer received replies from several Mexican botanists, all of whom, following Hernandez's description, were disposed to refer the plant in question to the genus Tagetes, which includes the so-called "French" and "African" marigolds of our gardens, both of which are flowers of Mexican origin, held in high esteem by the Aztecs and used by them in certain religious rituals. Dr. B. P. Reko of Oaxaca referred it to *Tagetes patula* and Dr. C. Conzatti thought that it might possibly be *Tagetes multiseta*. In a letter dated July 5,

[2] See Ximenes' translation of Hernandez, Cuatro Libros, Libr. 3, cap. 36. 1615.

1918, Dr. Conzatti says that, although Hernandez declares the xochipalli to be an herb well known to everybody, no one could be found who knew it: even the oldest natives in the vicinity of

Fig. 1 Xochipalli (*Cosmos sulphureus* Cavanilles), the "flower-paint" of the Aztecs, as figured by Hernandez in 1576 and published in 1651.

Oaxaca were ignorant of such a plant. Since Hernandez described it as having "flowers resembling the cempoalxochitl (*Tagetes erecta*) but smaller," Dr. Conzatti was inclined to refer it to the smaller cempoalxochitl, *Tagetes multiseta*, a dried speci-

men of which he enclosed in his letter. That the plant in question could not possibly belong to the genus Tagetes was shown at once by the form of the involucre subtending the flower-head, which according to Hernandez's drawing, was not at all cup-shaped, or tubular like that of Tagetes but composed of several distinct linear bracts. A comparison of Hernandez's rude illustration (fig. 1) with herbarium specimens of Tagetes showed that the plant in question could not possibly be included in the same genus with them. His figure represents a composite with flower-heads not unlike those of a Coreopsis, but the accompanying leaves are artemisia-like as stated in the original description. The widely spread ray-flowers, few in number, are three-toothed at the apex. On one of the heads they have fallen off, indicating that they are not persistent like those of Tagetes. The disk flowers form an erect cylindrical bundle, while the entire head is subtended by an involucre not at all like that of the genus Tagetes, but composed of a few linear sepal-like bracts as stated above.

Failing to find the plant in the genus Coreopsis, the writer carefully examined the plants belonging to allied genera. At last, in the genus Cosmos, he came upon a species corresponding in all respects with Hernandez's figure. The long sought Xochipalli proved to be *Cosmos sulphureus*, a species which, though figured the latter part of the eighteenth century by two eminent botanists, had never been associated with the dye-plant described and figured by the great protomedico a century previously. To verify the discovery, a decoction of the flowers was made for the writer by Dr. L. A. Hawkins, Plant Physiologist, of the Department of Agriculture. Almost immediately the water became suffused with an orange tinge, and on the addition of a very small quantity of alkali it changed to a rich orange-red, the color of the xochipalli described by Hernandez.

Though never hitherto connected with the classic "flower-color" used by the Aztecs in painting their codices, *Cosmos sulphureus* is not a rare plant. Specimens of it were lacking in the United States National Herbarium until 1886, when it was encountered by the veteran explorer Dr. Edward Palmer in the

Fig. 2. ***Cosmos sulphureus*** **Cavanilles,** *a*, **disk flower;** *b*, **achene.**

vicinity of Guadalajara, Jalisco; and five years later he collected it at Culiacan, Sinaloa, bringing back with him from this locality seeds from which plants were propagated at Washington. The account of its introduction into cultivation in the United States is told by Dr. J. N. Rose in *Garden and Forest* for December, 1895, where an excellent figure of it was published. It is now represented in the United States National Herbarium by specimens from many other parts of Mexico: from Durango, Sonora, Tepic, Colima, Oaxaca, Chiapas, Guerrero, and Morelos. It is interesting to note that this species, observed by Gemelli-Careri centuries ago while traveling between Acapulco and Cuernavaca, has been collected at both of these terminals, at Acapulco by Dr. Palmer, in 1894, and at Cuernavaca by Dr. J. N. Rose, in 1902. Seeds of this classic dye-plant of the Aztecs were recently obtained by the writer, and he now has a number of vigorous young plants of the true xochipalli growing in one of the greenhouses of the United States Department of Agriculture.

DESCRIPTION

Cosmos sulphureus is a tall, rank, pubescent annual composite, growing usually about four to seven feet high, with stems as thick as the thumb and bipinnatifid or tripinnatifid leaves, not unlike those of the common *Artemisia vulgaris* in form. The flower heads, borne on long slender peduncles, are subtended by a calyx-like involucre composed of two series of eight bracts each, the outer bracts linear and green, the inner broader and scarious. The flowers vary in color from bright orange to deep reddish orange. The heads are composed of eight broadly ovate ray-flowers, three-toothed at the apex, spreading at right angles to the axis and soon falling off, and fertile tubular disk flowers forming a compact erect cylindrical bundle. The exserted anthers are black with orange tips, and the style is branched, terminating in two slender tips. The fruit is a linear akene nearly an inch long, including the slender barbed beaks, and the pappus consists of two slightly hispid awns.

REFERENCES

Cosmos sulphureus Cavanilles, Icon. Pl. **1**: 56, pl. 79. 1791. Rose, Gard. & For. **8**: 484, *fig. 66*. 1895.

Coreopsis artemisiaefolia Jacquin, Icon. Pl. Rar. 595; Col. Suppl. 155. 1791.

Xochipalli . . . folia ferens sinuosa, magna, et Artemisiae quadantenus similia. Hernandez, in Nard. Anton. Recchi, Rerum Medic. Nov. Hisp. Lib. 7, Cap. 36. 1651.

In the accompanying illustration (fig. 2) the plant is shown, slightly reduced, accompanied by drawings of a disk flower (a) and an achene (b), the two latter enlarged about two diameters.

BOTANY.—*A new Polystichum from California.*[1] WILLIAM R. MAXON, National Museum.

In reviewing recently the Polystichums of the Pacific coast region of the United States as represented in the National Herbarium and in the very ample collections of the Dudley Herbarium of Leland Stanford Junior University, the latter lent for study through the courtesy of Professor LeRoy Abrams of that institution, it has been found that the plant of the Santa Cruz peninsula and of two or three localities not far northward which has commonly been referred to *Polystichum aculeatum* (or formerly to its "var. *angulare*") represents a new species. This is described below, being named in memory of the late William R. Dudley, for many years professor of botany in Leland Stanford Junior University.

Polystichum Dudleyi Maxon, sp. nov.

Rhizome stout, decumbent, together with the numerous stipe-bases densely paleaceous, the inner basal scales mostly linear-lanceolate, attenuate, dark brown, dull, semiopaque, imbricate, those above spreading, larger and broader, narrowly oblong to ovate, long-acuminate, up to 2 cm. long, brown to fulvous, concolorous, translucent, membranous, distantly denticulate-ciliolate, extending well up the stipe but mostly deciduous above the basal third, underlaid by a dense series

[1] Published with the permission of the Secretary of the Smithsonian Institution.

of small, narrow, attenuate, paler scales, these freely denticulate-ciliate. Fronds several, erect-spreading, 40–120 cm. long; stipes stramineous above the dark arcuate base, usually more than half as long as the blade, sulcate; blades narrowly ovate to narrowly oblong-lanceolate, very long-acuminate to long-attenuate, 25–75 cm. long, 8–25 cm. broad, bipinnate; rachises densely and subpersistently paleaceous, the scales pale, mostly linear-attenuate, or acicular from a small, roundish-cordate, fimbriate base; pinnae numerous, the lower ones slightly apart, spreading, a little shorter than those above, these mostly contiguous, oblique, often strongly arcuate, linear to narrowly oblong-lanceolate from a broader, invariably inequilateral base, attenuate from the middle, the apex rather abruptly acute to long-acuminate; pinnules numerous, oblique, straight or usually falcate, petiolulate, obliquely ovate or ovate-oblong from a distinctly cuneate, inequilateral base, the superior basal pinnule much the largest, this obliquely cleft or with several pairs of nearly free segments, the other pinnules auriculate, serrate to obliquely incised, the acuminate apex and the curved serratures rather abruptly short-awned; pinnules with a copious covering of pale, lax, sinuous, tortuous, filiform scales beneath, a few similar scales borne on the upper surface; leaf tissue bright light green, papyraceous, the course of the veins evident above; sori numerous, terminal or subterminal upon the first anterior branch of the oblique veins, or several pairs borne upon the simple pinnately arranged veinlets of the auricles and of the segments of the superior basal pinnules; indusia orbicular, membranous, copiously long-ciliate, the cilia flaccid, septate, frequently equaling in length the diameter of the body of the indusium.

Type in the U. S. National Herbarium, no. 887829, collected "near bridge, Peter's Creek," Santa Cruz Mountains, San Mateo County, California, May 2, 1903, by W. R. Dudley. Three sheets with identical data are preserved in the Dudley Herbarium, which contains also numerous other collections by Professor Dudley of the same plant from the Santa Cruz peninsula, as follows: Near bridge below La Honda, San Mateo County, March 24, 1894; King's Mountain, San Mateo County, March 5, 1898; sandstone rocks, Upper Gazos Creek, San Mateo County, January 1, 1902; cliffs near Camp on Pescadero Creek, Santa Cruz Mountains, San Mateo County, June 19, 1905; rocky canyon of east fork of Waddell Creek, Santa Cruz County, September 23, 1901; south fork of Big Creek, Santa Cruz County, August, 1903; Los Gatos Canyon, Santa Clara County, April 21, 1895, July 22, 1895. Other specimens from the same or near-by regions are as follows: Foothills west of Los Gatos, Santa Clara County, *Heller* 7226; Hume Canyon, Saratoga, Santa Clara County, alt. 270 meters, *Pendleton* 1468; Santa Cruz Mountains, *Anderson, Miss E. B. Norton, Mrs. A. E. Bush, Miss Bowles;* San Gregorio, San Mateo County, May 31, 1870, *Brannan & Kellogg;* Ukiah, Mendocino County, May 11, 1869, *Kellogg;* above "Grimes," Santa Lucia Mountains, Monterey County, August, 1903, *Dudley;* without special locality, *Kellogg & Harford* 1183.

Polystichum Dudleyi was figured by D. C. Eaton as *Aspidium aculeatum* var. *angulare* in the second volume of the Ferns of North America,[2] but the illustration is defective in failing to show the pinnules as distinctly stalked and copiously clothed with filiform scales, and as sufficiently oblique. In papyraceous texture, fully bipinnate blades (which are only slightly narrowed at the base), stalked pinnules, and terminal or subterminal sori the relationship of *P. Dudleyi* is clearly with the European plant called *Polystichum angulare* by most English botanists, *Aspidium aculeatum* B. *aculeatum* by Milde, *Aspidium lobatum* β *angulare* by Luerssen, and *Polystichum aculeatum* by Christensen, the last author maintaining *P. lobatum* (Huds.) Presl as specifically distinct; but, inordinately variable as the European plant is, *P. Dudleyi* is at once distinguished from that by its invariably oblique, less strongly awned, and more copiously filiform-paleaceous pinnules, and by its strikingly fimbriate-ciliate indusia. The enlarged superior basal pinnules are a constant feature not seen in most forms of *P. aculeatum* (*P. angulare*); in this particular alone *P. Dudleyi* suggests *P. lobatum* (the *P. aculeatum* or *P. aculeatum* var. *lobatum* of British botanists, *Aspidium lobatum genuinum* of Luerssen, *Aspidium aculeatum* A. *aculeatum* of Milde), a plant otherwise very different in its barely bipinnate blades (these strongly narrowed downward), its sessile to adnate, less incised segments, its dorsal sori, and its harsh, rigid texture. It is worth noting also that, so far as specimens at hand and descriptions indicate, the European plants have the indusia entire or, at most, minutely erose, a marked departure from the conspicuously long-ciliate indusia of *P. Dudleyi*. Although the proper classification of the very numerous European forms of this alliance is admittedly a difficult matter, it appears that related American plants are almost without exception specifically distinct from them. In the present instance *P. Dudleyi* may be regarded as an analogue of the European *P. aculeatum*, just as *P. californicum* (D. C. Eaton) Diels, is to a certain extent, a Californian counterpart of *P. lobatum*.

[2] *Pl. 62, f. 7.* 1879.

ANTHROPOLOGY.—*Catawba notes.*[1] JOHN R. SWANTON, Bureau of American Ethnology.

The writer spent the greater part of the month of May, 1918, on the Catawba reservation, South Carolina, collecting linguistic material from some of the few Indians still able to use the old Catawba language. These Indians have been surrounded by whites and negroes for such a long period and their economic condition has altered so completely that one feels uncertain whether the scraps of information regarding the old life and beliefs now to be obtained had a purely Indian origin, and how far they may have been colored by external influences. Nevertheless these scraps may have some value for future investigators who may be in a better position to separate the various elements entering into them. At any rate such scraps are all that we now have, outside of the very limited material from earlier writers such as Lawson, and I give them for what they may be worth. They were collected merely incidentally in the course of the linguistic investigation, and are principally from an old woman named Margaret Brown and her son John Brown. An account of the only important native industry which has come down to modern times, pottery making, has been omitted, since this has been treated very fully by Mr. M. R. Harrington[2] in a special paper containing also a few notes on other features of Catawba ethnology.

Margaret Brown says that when she was a girl the Catawba lived, not in frame houses as they do today, but in brush dwellings. According to her description these had a single ridgepole supported at either end by a forked stick, a roof of pine bark, and walls of brush. The house was round or oblong, the door in the latter case being midway of one of the longer sides, and along the wall opposite to the door was a bed of the usual southern Indian style, a bench of wattle or matting supported by short poles. The fire was in the middle of the house, and there was no vent for the smoke except the door.

[1] Published with the permission of the Secretary of the Smithsonian Institution.

[2] HARRINGTON, M. R., Amer. Anthrop. n. ser. 10: 399–407.

Spoons, long trays, and other dishes were made of wood from the dogwood and cedar trees. Pipes were of pottery or stone, stone working having been a native industry as well as working in clay. John Brown can make bone and flint arrow points with one or more barbs, but I do not think he has acquired his knowledge from the Indians, or at least from those of his own tribe.

In making baskets they used the following dyes: (1) a red dye from a plant called in Catawba wayûk, popularly "coon roots;" (2) another red dye from the "red root," Catawba taktuwia; (3) a yellow dye from a plant called ĭtĭ wiyeˢ, "yellow root;" and (4) black from the black walnut. There were probably others which have been forgotten.

The ancient dress seems to have been practically identical with that of other southeastern Indians. Margaret Brown said she had seen aprons in use made of large hickory leaves pinned together with broomstraw. Small knit caps or hoods for children were fabricated out of the inside bark of the slippery elm, but nothing seems to be remembered about the old mulberry-bark textiles. It is, however, recalled that little bags of sand were placed on the foreheads of infants to give them "a heap of sense," an evident reminiscence of the ancient custom of head-flattening. Adult Indians made a hair-wash out of the red sap from broken stems of young grapes.

The Catawba had white, yellow, and blue corn, strawberry corn—corn striped red all over—and popcorn. Which of these were truly aboriginal it would be impossible to say. The old native beans (Iˢye nuntce) are said to have been of the size of lima beans, colored black with white spots. The native tobacco is reputed to have been about 4 feet high but with broad leaves. It is thought that the "sow weed" (*Oxalis violacea*), called by the Catawba nūpaiˢtare, was sometimes smoked. Like all of the other southeastern Indians the Catawba pounded their corn into meal in a wooden mortar, usually of hickory. The inside was lined with tacks to keep the wood from fraying out and leaving splinters in the meal. To take off the outer skin of the corn they put it into a pot over the fire along with wood ashes.

They also employed a fanner (wûski'), and two sifters, the coarser known as no^{n}so' kāttcigne, and the finer as kûs ompa, and the dishes made from it appear to have been identical with those known to the other southern Indians. Among them were hominy (kuspi seratere), cold meal (kûs umpasa'), and the famous dish known to the Creeks as sofki but called by Catawba Indians kusimeyū. The hominy was also mixed with cooked beans and squeezed up into cakes called kusta^{n} notcepetcō'. When they ate these they commonly sat in a circle around a big dish of gravy into which each dipped his cake. Like the other southern tribes the Catawba also put cornmeal dough mixed with beans into cornhusks, and cooked a number of them together in a pot over the fire. Cornmeal dough was sometimes laid upon oak leaves which had been placed upon sand, other oak leaves being raked over the top, and the whole covered with sand, after which a big fire was lighted over all and the dough roasted. Again cornmeal dough was sometimes placed on a short smooth board and cooked in front of the house fire. This dish was called kusta^{n} i^{n}pitē^{n} kīsa ikta^{n}. It was occasionally enriched by adding persimmons, the seeds of which had been removed. Parenthetically I was assured that persimmon seeds make excellent coffee. I learned nothing about the use of hickory and acorn oil, though it was certainly resorted to but a good flavor was given to hominy by stirring in walnut meats thoroughly, while the pot was boiling.

Beef, and at an earlier period venison, was cut into strips and hung aroung the fire to dry. When any of this was desired a piece was taken off and broken up fine in a stone mortar with an iron pestle. The resulting fragments were put into a big pan, gravy was poured over them, and all sat around and ate out of the one dish. Meat was boiled in pots hung over the fire or roasted on wooden spits. Cooking was sometimes performed at the fire inside of the house, sometimes at a fire out of doors.

Fish were stupefied and then caught in the usual southeastern style, by pounding up buckeye, devil's shoestring, and some other plants and throwing them into a pool of water.

Medicines were of the same miscellaneous character observable elsewhere among Indians, but were mostly from plants. The following list contains all that I learned of during my short stay, but there were of course many more. For the botanical identifications I am indebted to Mr. Paul Standley, of the Smithsonian Institution.

Ya' suâⁿ wītīwą', "rattle snake medicine," *Agave virginica*, used, as the name implies, in curing snake bites, but sometimes in cases of dropsy. In cases of snakebite the roots were mashed up and put into water, some of which was then taken internally and some applied externally. For dropsy they selected the smaller roots, pounded them up, and added them to a glass of clear water, along with a tablespoonful or two of whisky. Some was then applied externally to the affected parts, but the rest taken internally, one tablespoonful three times a day.

Depôⁿwâⁿ yisi nõⁿne'-i, or poⁿwoⁿ yąsină', popularly known to whites as "Sampson's snake root," was used to stop pains in the stomach, an infusion, hot or cold, being drunk or the roots chewed. It was also applied to cure backache.

Wâⁿsa haone' (or wâⁿsa hawinon), popularly called "star grass," *Aletris farinosa*. An infusion was drunk to cure stomach trouble and dysentery.

Yīreⁿtce wītīwą', *Cracca virginiana*, popular name "devil's shoestring." In olden times it is said that a tea was made from the roots of this plant along with those of the low sumac, but it is not known for what ailment.

Hāstūk, *Erigeron ramosus*. A drink was made of the roots and taken in cases of heart trouble.

Dõpa sīgrīhere, *Salvia lyrata*. A salve to put on sores was made of the roots.

Itĕwąrąp wĕtere, *Senecio* (*smallii?*), was considered good for consumption.

Isdawąrąphere wĕtikrīⁿare, "it is good medicine for backache," *Arnica acaulis*, was used, as the name implies, for backache; the green leaves were crumpled up and laid on sores.

Serak wąrûwĕ', *Oenothera fruticosa*. The roots were used to wash sores.

I^{n}yāb wąp (or wąrop) krī^{n}here, "good for toothache," *Hypoxis hirsuta*. The roots were pulled up and chewed and some of the chewed root inserted into the cavity in the affected tooth.

Witsągua^{n}-i skąmpatcī'ą, *Parthenium integrifolium*. When a horse had a sore back the leaves were burned and the ashes applied to it. People sometimes placed the fresh leaves over burns.

Wēte wôropkere, *Psoralea pedunculata*, popularly called "bald roots." The roots of this plant were scraped fine, beaten, and stirred up in water and the decoction applied internally and externally to sores or cancers. The cure was said to be infallible.

Wīti si^{n}wąre, "blossoming medicine." This has a flower like that of self-heal but larger. The roots were used in cases of backache and by women.

Surēąre, *Marshallia obovata*, a wild clover, used in certain diseases.

Wāswâ^{n} wētīwąre, *Prunella vulgaris*, used in certain diseases.

The bark of the slippery elm was used in cases of consumption.

The ītī wiye^{n}, "yellow root," from which the yellow basketry dye was obtained, was chewed to heal a sore mouth.

The wayûk, or "coon roots," mentioned as used in dyeing baskets, were also fed to animals to make them lively and improve their appetites.

From broomweed roots they made a drink to administer to malarial patients, and from its stalks, cut up and mixed with water, an eyewash.

A few medicines non-vegetal in character, were also spoken of. It was thought that chills might be cured by swallowing a grandaddy-long-legs rolled up in dough. Rattlesnake rattles were hung about the head to cure headache. In order that newborn babies might have long lives the heart of a "couter" turtle was dried, beaten fine, and stirred up in water which the child was made to drink. To improve the speech of a child unable to talk plainly the green burrs of the sweet gum were taken at the time when they first come out and burnt to an ash which the child was made to blow upon.

When a marriage took place among the older Catawba the couple was seated back to back and a white cloth thrown over

them. It is not believed that the speech of men and women differed, but the present condition of the Catawba language is such that this statement has little value.

Bodies of the dead were anciently put under the beds inside of the houses themselves, some person making a speech on the occasion. If one died in the morning he was buried the same evening; if in the evening he was buried next morning. As soon as a death occurred three live coals were placed upon each piece of cold bread in the house so that the ghost of the deceased would not eat it, and no food of any kind was taken by the people of the household until after the body had been laid away. In the intervening period they frequently warmed their hands at the fire and then rubbed their faces with them; otherwise they feared that the skin of the face would become drawn up and wrinkled something like the skin of a chicken.

When a partridge (ipąkä) went through the yard it was a sign that someone in the house would soon die. When the calf of the leg twitched it was a sign that someone was coming. When the arm twitched it was a sign that someone was coming on horseback. When the mouth or eye twitched it was a sign that the person to whom this happened was going to mourn over a death in the family or some other severe affliction.

A relic of the belief in witchcraft is preserved in the story of a woman who once turned into an owl, went out of the house through her chimney, and stole chickens which she brought back in the same way.

At one place in Catawba River is a row of rocks where noises are sometimes heard, said to be caused by old Indians crossing there. At a place near the reserve known as "the old Indian town" people are sometimes heard dancing and singing. Close to the river there, a man once saw a woman dressed in the ancient manner, with a bundle on her back and bow and arrows (!). She disappeared suddenly.

Aside from these tales I learned of only one story that has the appearance of an aboriginal Indian tale, and of this only in outline. It relates that a child was once stolen away from its mother, and the latter began hunting for it. She asked the

various animals and other living creatures which she encountered, one after the other, if they could tell her anything of her child, but in vain. At last, however, she came to the giant red-headed woodpecker (wątcāk) who said that he knew and would inform her if she would give him a pair of earrings. She agreed and the bird said that the child had been stolen by an old woman, the owl, who had carried it far north to the other side of the Cherokee mountains. Upon hearing this the woman gave the bird her earrings and continued on to the place indicated. After she had recovered her child, the old woman who had stolen it began to rise from the ground, and as she ascended her bird tail grew longer and longer, and finally she became the comet.

Two principal dances, possibly vestigial ceremonies, are remembered, the Bear dance and the Wild Goose dance. Originally they took place out of doors, near the full of the moon, the former about roasting-ear time, the latter in the fall. In the later period of decline they were held indoors in winter. A drum was used, and the men carried gourd rattles, while the women had turtle-shell rattles fastened to their ankles in the familiar southeastern manner. The participants imitated bear and wild geese as well as they were able, the leaders being chosen in particular for their skill in representing the parts. Besides these there is said to have been a black snake dance.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. The abstracts should conform in length and general style to those appearing in this issue.

BACTERIOLOGY.—*A study of the Streptococci concerned in cheese ripening.* ALICE C. EVANS. Journ. Agr. Res. **13**: 235–252. 1918.

Two species of streptococci are distinguished from the well-known *Streptococcus lacticus*, and all three species are described culturally and biochemically.

The most pronounced characteristic which distinguishes *S. lacticus* from the other two species is the small quantity of acetic acid which it produces in milk cultures. Vigorous strains curdle litmus milk in less than two days, with complete reduction of the litmus beneath the pink surface layer. Crystals of tyrosin are formed in milk cultures after several weeks incubation. Peptone yeast broth of a hydrogen-ion concentration of $P_H = 6.0$ is rendered alkaline with a final hydrogen-ion concentration of $P_H = 6.8$.

Streptococcus X requires from two to twelve days to curdle milk. The litmus is not reduced, or is only partially reduced. No crystals are formed in milk cultures. The hydrogen-ion concentration of peptone yeast broth is reduced to the same point as in the case of *S. lacticus*. Streptococcus X produces a comparatively large quantity of acetic acid in milk cultures (0.7 to 0.8 gram per liter).

Streptococcus kefir is notable among dairy streptococci because of its vigorous production of carbon dioxide when grown in milk containing peptone, or in trypsin digested milk. It does not produce sufficient acid in milk cultures to bring the milk to curdling. There is no reduction of the litmus. No growth takes place in peptone yeast broth.

Experimental cheese inoculated with the three species of streptococci alone or in various combinations showed that the flavor of cheese of the cheddar type and of soft cream cheese could be varied according to the species of streptococci used for a starter. A. C. E.

BACTERIOLOGY.—*The bacterial flora of Roquefort cheese.* ALICE C. EVANS. Journ. Agr. Res. **13**: 225–233. 1918.

This paper reports the study of the bacterial flora of imported Roquefort cheese as compared with the bacterial flora of experimental cheese of that type made in the Dairy Division of the Department of Agriculture. The experimental cheese differed from the imported in being made of cow's milk and ripened in rooms artificially cooled and moistened, whereas the imported cheese was made of sheep's milk and ripened in natural caves. The two varieties of cheese are very similar. The results of the study may be summarized as follows:

The microorganisms essential for the manufacture and ripening of Roquefort cheese are *Streptococcus lacticus* and *Penicillium roqueforti*. *Streptococcus lacticus* decomposes the lactose during the manufacture of the cheese and thus produces the lactic acid necessary for the cheese making. These organisms disappear from the cheese after about two or three weeks, being killed by the high concentration of sodium chlorid. The remaining flora of Roquefort cheese consists of cheese streptococci and *Bacterium bulgaricum*, organisms which are found in all kinds of ripening cheese. These organisms do not have any significant part to play in the ripening of Roquefort cheese.

The cheese slime consists of characteristic types of micrococci, rod forms, and yeast cells. The enzymes from the slime do not appear to be essential to the ripening of the cheese. The flora of both the interior and the slime of the experimental cheese was identical with the flora of the interior and the slime of the imported cheese.

If the maker of Roquefort cheese will inoculate properly with *Streptococcus lacticus* and *Penicillium roqueforti*, and provide the proper condition of manufacture and ripening, he need have no other concern about biological ripening agents. A. C. E.

BOTANY.—Eupatorium urticaefolium *as a poisonous plant.* C. DWIGHT MARSH and A. B. CLAWSON, Journ. Agr. Res. **14**: 699–715, pls. 52–55. 1918. *White snakeroot or richweed* (Eupatorium urticaefolium) *as a stock-poisoning plant.* C. DWIGHT MARSH and A. B. CLAWSON. U. S. Dept. Agr. Bur. An. Ind. Circ. **26**: 1–7. 1918.

Eupatorium urticaefolium is one of the plants that has been thought to be the cause of milk sickness, but published accounts of experimental work have been very contradictory. In this paper are detailed experi-

ments on cattle and sheep which show not only that the plant is poisonous, but that it produces many of the symptoms of milk-sickness, and undoubtedly is the cause of many if not most of the cases of so-called milk-sickness in cattle and sheep. The symptoms of the poisoning and the pathological results are worked out. The dosage is determined, and it is noted that Eupatorium poisoning is cumulative. It is not considered by the authors that Eupatorium poisoning explains all cases of milk-sickness, but it is thought probable that under this term is included also a bacterial disease.

The second paper is a résumé of the work on Eupatorium, of a more popular character than the above, and designed for distribution among the farmers. C. D. M.

BOTANY.—*The peanut a great American food.* H. S. Bailey and J. A. LeClerc. Yearbook, U. S. Dept. Agr. 1917: 746. 1918.

The composition and yield of the peanut and the methods of making peanut oil and peanut flour are discussed. It is shown that the shelled nuts are a splendid food, cheap and nutritious, and that peanut butter is highly useful in many ways, being rich in fat and protein. The methods of using peanut butter, peanut oil, and peanut flour are given.

PLANT PHYSIOLOGY.—*Wheat flour substitutes.* J. A. LeClerc. Iowa Coll. Agr. Bull. **16**: no. 33. 1918.

This is an address given at the Bakers' Short Course at Ames, Iowa. History of the use of substitutes was touched upon and likewise a digest of the food situation prevailing at the time. A discussion of the wheat kernel and of the composition of the various parts of the wheat kernel and likewise the losses due to milling were given. The speaker compared the amount of food value to be derived from 100 pounds of wheat when milled into white flour and when milled into graham flour. J. A. L.

PLANT PHYSIOLOGY.—*Respiration and catalase activity in sweet corn.* C. O. Appleman. Amer. Journ. Bot. **4**: 207–209. 1918.

Respiration in sweet corn in the milk stage is very high when the corn is first pulled. This high rate of respiratory activity falls off rapidly with storage. Catalase activity in a collateral set of ears

showed a decline with storage which is almost directly proportional to the decline in respiratory intensity after a like period of storage.

The catalase activity of the expressed juice from both sweet corn and potato tubers is a fair index of the comparative intensity of respiration in the tissues.

The data seems to justify the general induction that catalase action in these tissues, at least, is correlated with the oxidative processes involved in respiration. C. O. A.

PLANT PHYSIOLOGY.—*The effect of sodium nitrate applied at different stages of growth on yield, composition and quality of wheat.* J. DAVIDSON and J. A. LECLERC. Journ. Amer. Soc. Agron. **10**: no. 5. 1918.

This is the second of a series of papers on the same subject. The first, also published in the above named journal (**9**: 145. 1917), gave data regarding the influence of sodium nitrate applied at different stages of growth on the yield and protein content of the grain. In this paper a study of the straw is made instead of the grain. The protein content of the straw shows the same tendency as the protein content of the grain, viz, an increase of protein content as a result of the application of nitrates at the second stage (heading of the wheat). An increase in yield results when the nitrates are applied at the first stage.

ANTHROPOLOGY.—*An early account of the Choctaw Indians.* JOHN R. SWANTON. Mem. Amer. Anthrop. Assoc. **5**: 1–20. 1918.

The translation of part of an unpublished French memoir of uncertain authorship preserved in the Edward E. Ayer collection of Americana in the Newberry Library, Chicago. It appears to have been written shortly after the middle of the eighteenth century. Its peculiar value consists in the fact that, although the Choctaw were the largest tribe with which the French had intimate relations and although their customs must have been well known to many Frenchmen, this is the only lengthy account of them, so far as known, that has been preserved. In addition to numerous matters of general ethnological interest it contains unique information regarding the social organization of the Choctaw nation, something which has hitherto been shrouded in great obscurity. Both archeologists and ethnologists will be interested in the mention of pipes which were apparently made of stone obtained from the famous catlinite quarries in Minnesota. J. R. S.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

WASHINGTON ACADEMY OF SCIENCES

The Board of Managers met on October 28, 1918. The Board adopted the recommendation of the Executive Committee that "those honorary members of the ACADEMY who are enemy subjects be suspended until the end of the war, and that their cases be again considered at that time." The publication in January, 1919, of a new edition of the "Red Book," or directory of the ACADEMY and its affiliated societies, was approved.

ROBERT B. SOSMAN, *Corresponding Secretary.*

SCIENTIFIC NOTES AND NEWS

The Katmai National Monument has been established in Alaska by executive order of President Wilson, dated September 24, 1918. It consists of the volcano of Katmai and considerable outlying territory, including the Valley of Ten Thousand Smokes, which has been visited by several National Geographic Society expeditions under the direction of Prof. R. F. GRIGGS, of Ohio State University. It is expected by those interested in the establishment of the park that its reservation as a national monument will have been the first step toward making this remarkable region accessible to the public as a national park, similar to the Yellowstone and the Yosemite.

Dr. CHARLES W. RICHMOND, of the Division of Birds, United States National Museum, has been appointed Associate Curator of Birds in that Institution.

Mr. BRADSHAW H. SWALES has been appointed Honorary Curator of Birds' Eggs in the United States National Museum. This position has been vacant since the death of Dr. W. L. Ralph in 1907.

Lieut. HENRI CRETIEN, of the French Ministere d'Armament, has recently come to the Bureau of Standards to carry on research work in various military problems related to optics. He is the designer of the Cretien gun sight now universally used on air planes.

Prof. JOHN F. HAYFORD, dean of the College of Engineering of Northwestern University, is engaged in research at the Wind Tunnel Laboratory of the Bureau of Standards. This work is carried on in connection with the National Advisory Committee for Aeronautics, of which Prof. Hayford is a member.

Mr. DOUGLAS C. MABBOTT, biologist of the Biological Survey, U. S. Department of Agriculture, was reported in an October casualty list to have been killed in action in France. He was in the seventy-ninth company of the Sixth Regiment of the Marine Corps, and took part in the fighting near Chateau Thierry in July. Mr. Mabbott was born at Arena, Wisconsin, March 12, 1893, and entered the service of the Biological Survey in December, 1915. He enlisted in February, 1918. He was a member of the Biological Society of Washington, and had contributed for publication three papers on American wild ducks and their food habits.

Mr. WILLIAM DEC. RAVENEL has been placed in immediate charge of the administration of the National Museum with the title Administrative Assistant to the Secretary. The position of Assistant Secretary of the Smithsonian Institution, in charge of the National Museum, made vacant by the recent death of Dr. Richard Rathbun, has been discontinued, effective November 1. Mr. Ravenel has been connected with the Museum in an administrative capacity since 1902.

Miss MCDOWELL, Professor of Physics at Wellesley College, has returned to the Bureau of Standards on leave of absence.

Dr. F. W. MCNAIR, President of the Michigan School of Mines, is now at the Bureau of Standards working on airplane engine problems.

Mr. GEORGE W. MOREY, of the Geophysical Laboratory, Carnegie Institution, has been given a year's leave of absence and is in charge of the optical glass plant of the Spencer Lens Company at Hamburg, New York.

Dr. C. NUSSBAUM, formerly instructor in physics at Harvard University, has been engaged in the study of aeronautic instruments at the Bureau of Standards during the past summer.

Mr. E. P. PECK, formerly Superintendent of Operation of the Georgia Railway and Power Company, has recently come to the Bureau of Standards to assist in work connected with the standardization of electrical apparatus for the War Department.

Mr. B. H. RAWL, chief of the Dairy Division of the Bureau of Animal Industry since 1909, has been appointed assistant chief of the Bureau.

Dr. WILLIAM H. ROSS, of the Bureau of Soils, U. S. Department of Agriculture, has been commissioned a captain in the Chemical Warfare Service, and has been assigned to the Edgewood Arsenal, Edgewood, Maryland.

Boston Public Library